

WHAT IS CLAIMED IS:

- A1
1. A lateral conductive superjunction semiconductor device comprising: a monocrystalline semiconductor wafer having a substrate of one of the conductivity types; an epitaxially deposited trench receiving layer of said one of the conductivity types supported atop said substrate and having an upper surface; a plurality of spaced laterally extending trenches formed into said trench-receiving layer; a diffusion of the other of said conductivity types extending into the walls of said trenches and having a given depth and a given concentration; said trenches defining mesas between them of a given width and a given concentration; a drain region of said other of said conductivity types extending into said trench receiving layer and disposed at one end of said mesas; a MOSgate structure including a source region, base region and a gate electrode disposed at the other end of said mesas; the thickness and concentration of said mesas and said diffusions being selected to cause each to fully deplete under blocking voltage conditions wherein in each of said mesas extends between said drain region and said MOSgate structure.
  2. The device of claim 1 which further includes a dielectric filler in each of said trenches.
  3. The device of claim 1 which further includes source, drain and gate contacts supported on said upper surface and connected to said source region, gate electrode and drain regions respectively.
  4. The device of claim 1 wherein said substrate is a lightly doped P type material and wherein said diffusion and said mesas have RESURF concentrations.

5. The device of claim 1 which includes a further region of said other conductivity interposed between said substrate and said trench-receiving layer; said further region being more lightly doped than said diffusion; said diffusion extending into said further region along the bottoms of said trenches.

6. The device of claim 1 wherein said diffusion extends into said substrate at the bottoms of said trenches.

7. The device of claim 1 which further includes an insulation layer interposed between said substrate and said trench-receiving layer; the upper surface of said insulation layer being coplanar with the bottoms of said trenches.

8. The device of claim 5 which further includes a dielectric filler in each of said trenches.

9. The device of claim 5 which further includes source, drain and gate contacts supported on said upper surface and connected to said source region, gate electrode and drain regions respectively.

10. The device of claim 5 wherein said substrate is a lightly doped P type material and wherein said diffusion and said mesas have RESURF concentrations.

11. The device of claim 8 which further includes source, drain and gate contacts supported on said upper surface and connected to said source region, gate electrode and drain regions respectively.

12. The device of claim 8 wherein said substrate is a lightly doped P type material and wherein said diffusion and said mesas have RESURF concentrations.

13. The device of claim 9 wherein said substrate is a lightly doped P type material and wherein said diffusion and said mesas have RESURF concentrations.

14. The device of claim 11 wherein said substrate is a lightly doped P type material and wherein said diffusion and said mesas have RESURF concentrations.

15. The device of claim 6 which further includes a dielectric filler in each of said trenches.

16. The device of claim 6 which further includes source, drain and gate contacts supported on said upper surface and connected to said source region, gate electrode and drain regions respectively.

17. The device of claim 6 wherein said substrate is a lightly doped P type material and wherein said diffusion and said mesas have RESURF concentrations.

18. The device of claim 15 which further includes source, drain and gate contacts supported on said upper surface and connected to said source region, gate electrode and drain regions respectively.

19. The device of claim 15 wherein said substrate is a lightly doped P type material and wherein said diffusion and said mesas have RESURF concentrations.

20. The device of claim 16 wherein said substrate is a lightly doped P type material and wherein said diffusion and said mesas have RESURF concentrations.

21. The device of claim 18 wherein said substrate is a lightly doped P type material and wherein said diffusion and said mesas have RESURF concentrations.

22. The device of claim 7 which further includes a dielectric filler in each of said trenches.

23. The device of claim 7 which further includes source, drain and gate contacts supported on said upper surface and connected to said source region, gate electrode and drain regions respectively.

24. The device of claim 7 wherein said substrate is a lightly doped P type material and wherein said diffusion and said mesas have RESURF concentrations.

*AI contd*  
25. The device of claim 22 which further includes source, drain and gate contacts supported on said upper surface and connected to said source region, gate electrode and drain regions respectively.

26. The device of claim 22 wherein said substrate is a lightly doped P type material and wherein said diffusion and said mesas have RESURF concentrations.

27. The device of claim 23 wherein said substrate is a lightly doped P type material and wherein said diffusion and said mesas have RESURF concentrations.

28. The device of claim 25 wherein said substrate is a lightly doped P type material and wherein said diffusion and said mesas have RESURF concentrations.